# Just how flexible is the German selective secondary school system? A configurational analysis

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## Summary

School systems may be usefully characterised according to Turner's proposed ideal types of sponsored and contest mobility. Germany is a critical case with respect to this typology because its secondary school system is stratified and selective, and yet it offers the opportunity for upward and downward mobility. Drawing on an analysis of a German longitudinal dataset, this paper addresses the question of flexibility or rigidity of the school system, exploring the ways in which factors other than pupils' ability influence selection processes within that system. Both academic ability and ascriptive factors act together to facilitate or hinder changes of academic routes within the school system. The methodological focus of the paper is on the introduction to an innovative method, Charles Ragin's Qualitative Comparative Analysis, a method based on set theory. It involves the identification of necessary and sufficient conditions for a given outcome, taking conjunctions of causal conditions into account.



**Key words**

Selective school system

Educational mobility

Germany

Qualitative Comparative Analysis

# Just how flexible is the German selective secondary school system? A configurational analysis[1]

## 1 Introduction

Recently, in England, voices have again been heard arguing for the reintroduction of grammar schools, which have been replaced by comprehensive schools in most parts of the UK, claiming that these schools would provide greater social mobility for many children than comprehensive schools. In Germany, there is at present a secondary school system which in some ways is comparable to the old tripartite British system. Therefore, insights gained from the German system may serve to shed some light on the British debate. There is a long history of the British interest in the German education system (e.g., Ochs and Phillips 2002; Phillips 2000). Phillips (2000) points out that much can be learnt from comparing different educational systems, while care must be taken not to copy simply from another country. Instead, using another system may serve to become aware of shortcomings at home and better to understand one's own system.

This paper, drawing on an analysis of a German longitudinal dataset, addresses the question of social inequality in the school system, exploring the ways in which factors other than pupils' ability influence mobility processes within that system. Thus, it contributes to the ongoing debate across the world about how to ensure that pupils are given the best possible education, both in terms of fairness and the maximal attainment of as many pupils as possible. In Germany, this is attempted through a stratified and selective secondary school system. The purpose of this paper is to investigate the flexibility or rigidity of this system and to identify factors which

[1] I would like to thank Barry Cooper for his very helpful comments. Thanks also to two anonymous referees for their valuable feedback.

influence mobility within it, thus demonstrating how a particular school system shapes the way in which mobility processes take place. Various authors point out that the specific constellations of the educational system in the country of interest have to be borne in mind when analysing the mechanism of social status acquisition (e.g., Kerckhoff 1993; Müller and Karle 1993; Shavit and Müller 1998; Turner 1960). Lessons will be drawn for other countries at a similar level of development.

The paper builds on previous work with the same data (Glaesser 2008), but uses a different analytic approach: instead of regression analysis, Charles Ragin's Qualitative Comparative Analysis (QCA) is employed. An introduction to this method is given in the paper. QCA is based on set theory and makes use of Boolean algebra to analyse necessary and sufficient conditions for some outcome. It aims to preserve the characteristics of cases instead of focusing on the relations between variables. The strengths of this approach lie in the fact that it can identify combinations of causal conditions and alternative pathways to an outcome, that is, it allows for the fact that conditions may have to be present jointly in order to bring about an outcome, and that more than one pathway may lead to obtaining the outcome. The analyses presented in the paper will be used to demonstrate further these features of QCA.

## 2 Theoretical background

### *2.1 Sponsored and contest mobility*

There are various ways of characterising school systems with regard to the degree of selectivity. Turner (1960), in his classic article, contrasted two ideal typical systems, using Britain and the USA as his exemplars. He described the then prevailing norm in the British system as sponsored mobility, i.e. pupils are selected in competitive

examinations at an early stage in their educational careers for an academic route which allows access to high social class positions. For those not selected it is hard to catch up at a later point. The USA represent an example of the alternative norm of so-called contest mobility, a system open for all for as long as possible, resembling an ongoing contest, and which strives to provide equal educational opportunities up until school-leaving age and beyond. Allmendinger (1989) builds on this work when proposing her classification along the dimensions of stratification and standardisation. She points out how a classification scheme such as Turner's can be used to determine how mobility processes are linked to institutional features, placing particular emphasis on intergenerational mobility. Her own classification, by contrast, allows for the analysis of intragenerational mobility.

The German system is highly stratified according to Allmendinger and could in some sense be characterised as 'sponsored' in Turner's terms. A sponsorship system involves early selection of talented children into academically oriented schools with the promise of eventually attaining elite status through that route. It also implies the presence of an elite who are anxious to maintain the right of conducting this selection and who are not in favour of giving pupils at all stages of their secondary school career the chance to obtain the academic credentials promising elite status. It is well documented that early selection takes place in Germany. In addition, in public debates, there is some evidence of the presence of an elite who defend the continued existence of the Gymnasium in particular. Most recently, this became obvious in the heated debate on abolishing the tripartite system, reported in the German weekly DIE ZEIT (29/2007). This is by no means only a recent debate, however. For example, Drewek and Müller (1982) argue that the tripartite system is set up in a way which promotes rigidity rather than flexibility and that the selection process serves to

maintain social status, even though achievement is supposedly acting as the determining factor.

Still, there have been attempts to facilitate movements between school types – in both directions – so that now opportunities are provided at a later point than the end of primary schooling for obtaining higher qualifications than the ones offered at one's originally attended secondary school. Achievement of a minimum academic standard, indicated through the marks obtained at secondary school, is required for such an upward movement from the lowest category, while low marks may lead to dropping out from Gymnasium. This might be regarded as a move towards a contest system, in that the opportunity to attain elite status is held open for longer. Note, however, that this is usually attempted within the existing tripartite system, i.e. the changes have not been towards comprehensive schooling. Instead, the existing boundaries are maintained, they are simply made more flexible. This may be of limited value however, since employers still seem to take the school initially attended into account rather than actual qualification (Schuchart 2007), another indicator of the deeply ingrained belief in the importance of the type of secondary school attended.

### *2.2 The German secondary school system*

At this point, the German secondary school system will have to be explained briefly in order to set the stage for the actual research questions.

In Germany, the secondary school system comprises three distinct types of school into which children are sorted according to their academic ability at the age of 10. The lowest school type is Hauptschule, offering the qualification Hauptschulabschluss, the intermediate one is Realschule, offering Mittlere Reife, and the highest one which prepares its pupils for university entry is called Gymnasium, offering the Abitur. Such

a selective secondary school system has the potential of offering some children the chance of upward social mobility since able children have the opportunity of obtaining a good education regardless of their social background. On the other hand, there is a danger of the system reinforcing existing social class boundaries, because children from more favourable social classes tend to go to the highest school type more often for various reasons. In principle, the children's primary school teachers allocate them to a school type, based on the marks in German and maths, but sometimes also taking account of other subjects and/or attitude to work. However, there are several ways in which parents can influence this allocation. Parents who themselves have had a good education are more likely to give their children educational support in the first place, thus helping to fulfil the entry requirements for the more academically oriented school types. In addition, they can appeal against the teachers' decision and request that their child be given the opportunity of sitting an entrance exam for the desired school type at the time of the teachers' decision. This is more frequently undertaken by more highly educated parents. Later on, those parents will more often encourage their children to make use of existing opportunities for changing school type. On the other hand, children whose parents have only the most basic school qualification themselves may choose not to attend a more academically oriented school type, in spite of a positive teachers' recommendation.

The German system is characterised by not only upward but also downward mobility within the secondary school system. Having gained a place at Gymnasium makes obtaining the Abitur likely, but by no means certain. While poor academic performance can lead to drop-out from the Gymnasium, ascriptive factors may also contribute to this, either by aggravating the effects of poor performance or by substituting for it. Mobility may take place in two ways: either by actually moving to

a different school type which can be higher or lower, or by remaining at the same school but gaining a different qualification from the one normally on offer there. In the case of Gymnasium, this means being granted either Hauptschulabschluss or Mittlere Reife on dropping out, in the case of Hauptschule it means staying an extra year after the successful completion of Hauptschulabschluss, thus gaining Mittlere Reife. In this paper, I do not distinguish between these two ways.

### *2.3 Previous research*

It has become clear from the last section that intragenerational mobility within the German secondary school system cannot be considered independently of the question of the role of social background. Allocation to a school type and subsequent decisions do not only depend on ability even though this is the ideal.

Previous research in Germany has indeed shown that, in addition to ability, social background influences the type of secondary school entered at the most crucial branching point, the transition from primary to secondary school (e.g., Baumert *et al.* 2003; Fend 2000, p. 179), in that children from lower social classes less frequently attend the higher school types (Realschule and Gymnasium) compared with children from a higher class background of the same academic ability. The various alternative routes which do exist in order to allow changes between schools at a later stage are supposed to compensate – at least partly – for the early social selectivity. However, the social selectivity of the earlier decision may in fact be reinforced later on when factors such as social background or rural/urban differences in terms of culture and educational opportunity structure, instead of or alongside performance or ability, again influence decisions about educational pathways (Henz 1997; Hillmert and Jacob

2005). Fend (2006) also investigates how later movements are brought about, using the same data as the present study but with a different focus and analytic approach.

This paper investigates the actual extent of the later revision of the selection decision made just prior to entry to secondary schooling, and explores the factors associated with a greater or smaller likelihood of between-school changes and the later acquisition of higher qualifications. More specifically, the role of academic performance is investigated since the marks obtained during secondary school determine to some extent the opportunities for changing school type. In addition, three ascriptive factors were chosen for the analysis of the mobility processes at play: gender, parental education and, in the case of Hauptschule pupils, whether the children were brought up in a rural area or a city. This was included because it makes a difference for the ease with which pupils can get to a more academically oriented school, i.e. Realschule or Gymnasium. In some rural areas, a fair amount of travel is required in order to get to either of these schools, so it takes more determination to attend them rather than the local Hauptschule. We therefore have three out of the four dimensions of inequality captured in the term *katholisches Arbeitermädchen vom Lande* (catholic working class girl from the country), coined by Peisert (1967). There is not much reason to expect religion to act as an ascriptive marker of inequality any more (at least not the protestant/catholic divide), but I shall investigate the respective roles of the other three, even though Müller claims that out of the four, only social class still holds any importance (Müller 1998).

The focus here, then, is on how individuals move up or down within the secondary school system, i.e. on intragenerational mobility in Allmendinger's (1989) terms. Taking parental education into account adds an intergenerational perspective.[2]

## 3 Data

The data used in this paper are drawn from a German longitudinal study, the so-called LifE study[3]. During the years 1979-1983, ca. 2000 adolescents between the ages of 12 to 16 had been surveyed annually, making for just under 3000 adolescents who had participated at least once. They were from both rural and urban areas, varied social backgrounds and they attended different types and levels of secondary school. Further details on the sample can be found in Fend (1990). Twenty years later, in the year 2002, approximately 1500 participants could be contacted again and agreed to participate in a follow-up study. The aim of the LifE-Study is to gather information on successful development and its antecedents in the family, school, peers, and community contexts. The study provides extensive data on individual and context indicators in adolescence and a wide range of information on subsequent events. For the present study, those 1014 cases are used for whom data exist on type of school attended during adolescence and highest school qualification obtained by 2002, excluding those who had attended Gesamtschulen (comprehensive schools). The data are analysed using crisp set QCA, where dichotomous variables are employed. Table 1 gives details of the variables used and their coding. Marks have been dichotomised to reflect what is commonly considered a reasonably good mark. For

[2] In some sense, this intragenerational mobility is equivalent to educational mobility and intergenerational mobility corresponds to social mobility.

[3] LifE: *L*ebensverläufe *i*ns *f*rühe *E*rwachsenenalter (Pathways from late childhood to early adulthood). Authors: Helmut Fend, Werner Georg, Fred Berger, Urs Grob, Wolfgang Lauterbach. The study has been jointly conducted by the universities of Constance, Zürich and Münster. See www.uni-konstanz.de/lebensverlaeufe for an English summary.

example, an average of 3 in the last year of primary school is usually required for entry to the intermediate type of school, Realschule.

Table 1: Variables employed

| **Variable name** | **1** | **0** |
|---|---|---|
| UP | originally at Hauptschule, obtained higher school qualification later | originally at Hauptschule, didn't obtain higher qualification later |
| DOWN | originally at Gymnasium, didn't obtain Abitur | originally at Gymnasium, did obtain Abitur |
| PARENTS_HIGH | Parents have qualification higher than Hauptschulabschluss | Parents' highest school qualification is Hauptschulabschluss |
| MARKS | good marks (average 3 or higher)<br>This refers to the marks gained in German, Maths and English at the age of 15*. 1 is the highest, 6 the lowest mark, with 4 the lowest pass mark. | low marks (average lower than 3) |
| CITY | grew up in a city | grew up in a rural area |

*15 is an age when decisions with respect to further qualifications or dropout are usually taken.

## 4 Method: Qualitative Comparative Analysis (QCA)

The method chosen for the data analysis is not likely to be familiar to most readers and is therefore explained in some detail in this section.

Charles Ragin's Qualitative Comparative Analysis (QCA) approach[4] (Ragin 1987; 2000) is an alternative to regression-based methods. It attempts to identify configurations of causal conditions which are associated with the outcome, as well as alternative causal pathways. The focus is on the case rather than on the relation between variables. Originally, QCA was developed in the political science context, on small n data. More recently, the use of QCA in educational research, using large n

[4] As well as the method, Ragin has also, together with others, developed the software fs/QCA (for 'fuzzy set/Qualitative Comparative Analysis') (Ragin, Drass & Davey, 2006) which performs the required analyses. This is the software used here.

datasets, is being explored (e.g., Cooper 2005; 2006; Cooper and Glaesser 2007; Ragin 2003).

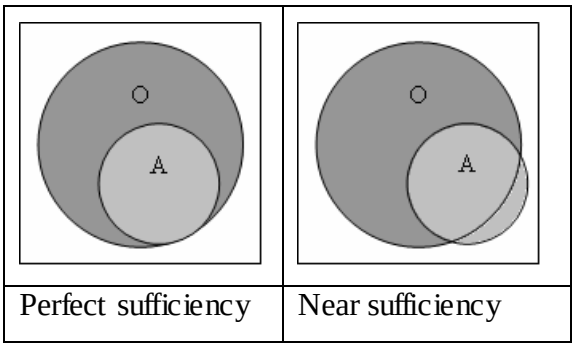
The basic principle of QCA involves the identification of necessary and sufficient conditions for a given outcome. The underlying principle is a set theoretic approach which involves determining subset relations. Consider table 2[5]:

Table 2: Simple implication: sufficiency

| 'if A, then O' expressed in terms of inclusion, sufficient relationship | | |
|---|---|---|
| | A | Not A |
| O | Present | Possible |
| Not O | Excluded | Possible |

This can be represented in a diagram (see the left panel of figure 1):

Figure 1: Sufficiency




Perfect sufficiency | Near sufficiency

In logical terms, condition A is sufficient for outcome O, that is, whenever A occurs, O will occur, as can be seen from the left hand column of table 2 and from the Venn diagram in the left hand panel of figure 1. This does not mean that A is necessary for

[5] Based on Boudon (1974) as discussed in Cooper (2005, 2006).

O to occur, there may well be other conditions[6] associated with O, as indicated by the right hand column of table 1. In set relation terms, A constitutes a subset of O.
In the real world, relations are less than perfect and we are more likely to find a situation such as the one represented in the right hand panel of figure 1. Therefore, it is necessary to consider instances of weaker implication, that is, the relative frequencies of cases rather than simple presence or absence (Cooper 2006).

This can be illustrated by adding some numbers to table 2 (see table 3). They represent a number of cases with the relevant conditions.

Table 3: Weaker implication: sufficiency

| Weaker implication, sufficient relationship: 'if A, then (nearly always) O' | | |
|---|---|---|
| | A | Not A |
| O | 90 | 150 |
| Not O | 10 | 50 |

Out of all the cases with condition A, 90 % experience O. This high proportion indicates that A is 'nearly always sufficient' to obtain O. These 90 % in our example can be referred to as the degree of *consistency* with sufficiency with which O is obtained given A.

This leads to the introduction of two other concepts, the related issues of necessity and coverage. Consider a variation of table 2 (see table 4):

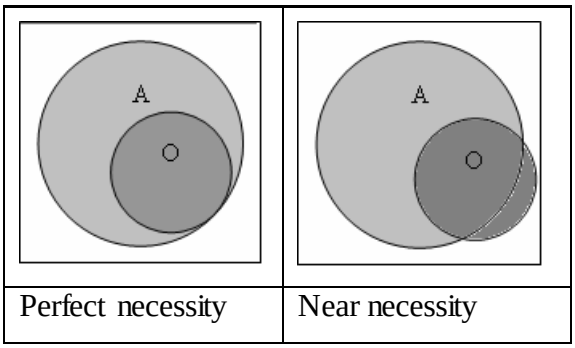
[6] I deliberately avoid the use of the terms 'cause' or 'causal condition' as the relationships described here are patterns of association. Causal statements can only be made based on theoretical considerations.

Table 4: Simple implication: necessity

| 'O, only if A', necessary relationship | | |
|---|---|---|
| | A | Not A |
| O | Possible | Excluded |
| Not O | Possible | Possible |

Here, A constitutes a necessary condition for O, that is, without A, O cannot occur. In set theoretic terms, A is a superset of O, as in the left hand panel of figure 2[7].

Figure 2: Necessity




Perfect necessity | Near necessity

Again, we have to consider the possibility of less than perfect necessity, illustrated through the right hand panel of figure 2. Adding some numbers to illustrate the necessity relation, we get table 5.

Table 5: Weaker implication: necessity

| Weaker implication, necessary relationship: 'O, only if A' | | |
|---|---|---|
| | A | Not A |
| O | 90 | 10 |
| Not O | 150 | 50 |

[7] Note that, in conducting research, temporal order and substantive knowledge need to be used in determining the causal order, i.e. the difference between figures 1 and 2 lies in what is considered cause and effect. It is conceivable that this may vary or not be clear in a research situation. For our purposes, however, we have decided that A is the cause and O the outcome. The determination of sufficiency and necessity is based on this decision.

Here, nearly all of the cases with the outcome O have experienced A. This points to A being a (nearly always) necessary condition for O. The proportion of cases with O who have previously experienced A is 90 %. It is called the explanatory coverage of O by A[8].

Note that this does not make any claims about A's sufficiency: from the left hand column, it is clear that if even A is present, O doesn't usually occur which points to the possible need for additional and/or alternative conditions which have to present in order for O to usually appear.

So far, in this section we have only considered the case of two variables, one independent and one dependent one. However, in the social sciences we usually find more than just one independent variable or causal condition, and we want to consider all the relevant ones simultaneously. This is where causal configurations come into play. In our example, it is possible to add the condition B. This results in table 6.

Table 6: Two conditions

| | A | | Not A | | |
|---|---|---|---|---|---|
| | B | Not B | B | Not B | Total |
| O | 85 | 5 | 120 | 30 | 240 |
| Not O | 5 | 5 | 30 | 20 | 60 |
| Total | 90 | 10 | 150 | 50 | 300 |

[8] Another way of thinking about consistency/sufficiency and coverage/necessity is in terms of inflow and outflow: in a cross-tabulation such as table 3, the proportion of cause A in O which we called consistency can be called outflow because it refers to the percentage of people with A who subsequently obtain O. The proportion of O with condition A as described in table 5 (called coverage) can also be called inflow because it refers to the percentage of people with O who got there after having also experienced A.

In order to determine the consistencies of the possible configurations, it is useful to represent the data in what is called a truth table, such as table 7. 1 denotes presence of a condition, 0 denotes absence.

Table 7: Truth table

| A | B | number of cases | proportion obtaining O |
|---|---|---|---|
| 1 | 1 | 90 | 94.4 |
| 0 | 1 | 150 | 80.0 |
| 0 | 0 | 50 | 60.0 |
| 1 | 0 | 10 | 50.0 |

Here, all the four configurations which can be obtained using the conditions A and B are listed and the respective proportions of their members obtaining O are given. These proportions represent the consistencies with respect to sufficiency of the configurations with regard to their achieving O. The rows of the truth table have been sorted into descending order of consistency. The coverage of a particular configuration can be obtained by calculating the proportion of the cases with a given configuration, say A and B (the first row in the truth table, table 7) out of all the cases with the outcome O, in this case 35.4 (85 out of 240 cases; cf. the top left hand cell of table 6). Note that it is not possible to see directly the number of cases with the outcome from a truth table such as table 7. It can be calculated from the number of cases in a given row together with the consistency figure, which in effect is the proportion.

It is conceivable that there is more than one configuration leading to the outcome. In this example, we might argue that the consistency values of 94.4 and 80.0 both are high enough for us to decide that these configurations can be considered to be usually sufficient for the outcomes. In other words, there is a reasonably high proportion of

cases with the configurations 'A and B' as well as 'not A and B' obtaining the outcome.

This leads to the issue of set theoretic notation and minimisation. Set intersection or logical AND is indicated by *. Set union or logical OR is indicated by +. Membership in a set is indicated by upper case notation, non-membership or logical negation is indicated either by ~ or by lower case notation which is what I use here. Looking at the example given above, the solution obtained can be noted as follows: A*B + a*B. This solution can be written in a simpler form, using logical minimisation, i.e. simply B[9].

Finally, another point can be illustrated using this example. First of all, there is an element of choice in that the researcher decides what level of consistency is to be considered acceptable when choosing a solution[10]. In our example, we might have argued that any proportion higher than 55 % obtaining the outcome indicates (near) sufficiency[11]. This would have given the following configurations in the solution:

A*B + a*B + a*b

Again, this solution can be further simplified, resulting in a + B. Using the software fs/QCA, it is possible to calculate consistencies for the individual configurations in a solution and for the solution as a whole. In addition, coverage is also given both for the individual configurations and the whole solution. Often, there is some overlap between the configurations found: in our example with the solution a + B, there are cases belonging to both configurations, i.e. all the ones with conditions a*B. In the

[9] This simplification is possible since in the solution, both the presence and absence of A are given. Therefore, A is irrelevant and can be left out.

[10] Going through various levels of consistency instead of choosing a single one brings out the relative importance of conditions which can be very instructive. Cooper (2005, 2006) makes use of this approach.

[11] This would be a rather generous threshold, however, and was chosen only in order to demonstrate a solution with several pathways. It is more common to choose a threshold of at least 0.75.

calculation of the coverage for the configurations contributing to a solution, there are two coverage figures given. Unique coverage refers to the proportion of cases with the outcome accounted for by cases in each configuration but not in the overlap, raw coverage refers to the proportion using all cases in the configuration, including those who are also covered by the other configuration given in the solution.

fs/QCA gives the following output for our example:

```
** TRUTH TABLE SOLUTION **

        raw             unique
        coverage        coverage        consistency
        ----------      ----------      -----------
a+      0.625000        0.125000        0.750000
B       0.854167        0.354167        0.854167
solution coverage: 0.979167
solution consistency: 0.810345
```

The unique coverage figure given for 'a' refers to the 30 cases obtaining the outcome (out of 240) who do NOT have B, that is, which are not included in the other part of the solution. The raw coverage figure refers to all those cases without the condition A (i.e., 'a'), regardless of whether B is present or not, i.e. 150 out of 240 who obtain the outcome. In the same way, the unique coverage given for B refers only to the 85 out of 240 cases who also have A. The overlap, i.e. a*B can be obtained by subtracting the unique coverage figures from the solution coverage. In our example, the resulting figure is 0.5. This refers to the 120 cases with a*B who experience O (cf. table 6). We can see that there is considerable overlap between the two configurations leading to the outcome: the unique coverage is fairly low for both of them compared to the respective figures for raw coverage, indicating that there are many cases in the configuration a*B. This is in line with what can often be observed in the real world: causes or conditions tend to occur together, which can make a regression analysis

with its assumption of independence of variables and its attempts to determine net effects questionable.

The consistency and coverage figures associated with a solution obtained through QCA give an indication as to how good the solution is. High consistency figures indicate that the solution is (nearly) sufficient, i.e. experiencing the conditions given by the solution is (nearly) sufficient for obtaining the outcome. High coverage figures indicate (near) necessity analogously.

So far, we have been concerned with crisp sets only, that is, those where a case is either in or out of a set. This is suitable for the analyses presented in the present paper since all the variables except for marks are dichotomous anyway and it was fairly straightforward to dichotomise the marks by using a substantively meaningful threshold. However, Charles Ragin has also developed QCA further to include fuzzy sets, where partial membership of a set is possible. This makes the analysis of multi-category and continuous variables possible. I do not have space here to explain the approach; for details see Ragin (2000; 2006) and also Cooper (2005).

One final point: In performing the analyses, I make use of the fact that QCA is suited to differentiating between the presence and the absence of an outcome, i.e. taking account of the possibility of asymmetric causation. Ragin (2005, S.12) points out that 'The question of which conditions are *impediment*s to [a given outcome] is not the same as the question of which conditions are *productive* of [this outcome]'. Lieberson (1985) discusses other aspects of asymmetric causation.

# 5 Results

## *5.1 Degree of mobility*

One important result is the finding that there is a certain degree of mobility, both upwards and downwards, although the majority of pupils obtain the qualification offered at the type of secondary school they originally attended. The cross-tabulation (table 8) shows the school type originally attended and the qualification finally achieved, with the cells containing the 'expected' outcome highlighted in grey:

Table 8: School type by qualification

| | | Highest qualification | | | |
|---|---|---|---|---|---|
| | | Hauptschul-abschluss | Mittlere Reife | Abitur | Total |
| Initial school type | Hauptschule | 163 (67.4%) | 62 (25.6%) | 17 (7.0%) | 242 (100%) |
| | Realschule | 13 (3.4%) | 270 (70.9%) | 98 (25.7%) | 381 (100%) |
| | Gymnasium | 2 (0.5%) | 63 (16.1%) | 326 (83.4%) | 391 (100%) |

Intragenerational upward mobility is clearly more common than downward mobility. About a quarter of pupils who were allocated to Realschule at the age of 10 and a third of those allocated to Hauptschule subsequently gain a higher qualification than that offered at their first secondary school, but only just over 16 % of those allocated to Gymnasium fail to obtain Abitur, and a very small minority of Realschule pupils don't achieve their Mittlere Reife. The implications of these findings will be discussed below, taking the factors which influence mobility into account.

### *5.2 Factors associated with presence or absence of mobility*

The analysis now turns to the question of who does or does not experience mobility. This question is approached from two directions. Upward mobility is investigated analysing pupils from Hauptschule, downward mobility is investigated using pupils from Gymnasium.

As noted above, academic performance as indicated through marks obtained constitutes a formal requirement for both upward and downward moves at later transition points. Therefore, the marks should play a crucial role in influencing such moves. This assumption is tested in the analyses. In addition, the roles of the ascriptive factors gender, parental education and upbringing in a rural area or a city are examined.

#### *5.2.1 Hauptschule*

As noted earlier, Müller (1998) claims that social class of origin is now the most important source of social inequality in education. Academic achievement, based on marks, is usually a prerequisite for upward mobility within the secondary school system. I therefore start by taking parental education, which serves as a proxy for social class[12], and marks only into account, analysing their relationship with the outcome '*not* moving up'. This can be seen as the expected route since most people remain where they were originally (see table 8). The resulting truth table (table 9) and Boolean solution are fairly simple, but they give a first indication of the relationship of these indicators with the outcome.

[12] I am aware that using parental education as a proxy for social class origin may be considered problematic. However, the data on parental social class in the LifE study are not very good, with many missing data and a coding scheme which is not clear in places. Since the focus of this paper is on educational processes, it seemed legitimate to analyse parents' education as a potential influence on educational outcomes instead of actual social class.

Table 9: Truth table Hauptschule: marks and parents

| parents_high | marks | number | ~up* | Consist |
|---|---|---|---|---|
| 0 | 0 | 25 | 1 | 0.88 |
| 1 | 0 | 17 | 1 | 0.764706 |
| 0 | 1 | 26 | 0 | 0.653846 |
| 1 | 1 | 27 | 0 | 0.518519 |

* When using lower case notation as I have done here and in all subsequent truth tables, the symbol for "not" is ~.

This truth table (table 9) gives details of the proportion of the different groups whose highest attainment remains the Hauptschulabschluss, in other words, who don't obtain a higher formal school qualification later on. The 1s and 0s entered in the outcome column '~up' reflect the threshold chosen for the Boolean solution described below. The pattern is informative: those rows containing individuals with low marks are at the top of the truth table, which is sorted in descending order of consistencies. This means that the groups of pupils with low marks have the highest proportion of not achieving a higher qualification. Within these groups, parents' education makes a considerable difference, however: in each of the groups with low and high marks, the proportion of pupils gaining a higher qualification is higher when their parents themselves have a higher qualification than Hauptschulabschluss. Looking at the first row of the truth table only, we see that having the combination of low marks and parents with Hauptschulabschluss is (nearly) sufficient for not moving up, the consistency with sufficiency being 0.88.

Choosing the slightly lower threshold for sufficiency of 0.75, we get a solution which only contains low marks as a (nearly) sufficient condition for remaining at Hauptschule level.

** TRUTH TABLE SOLUTION **

| | raw coverage | unique coverage | consistency |
|---|---|---|---|
| marks | 0.530303 | 0.530303 | 0.833333 |

solution coverage: 0.530303
solution consistency: 0.833333

To summarise: low marks are (nearly) sufficient to prevent the attainment of a higher qualification, having attended Hauptschule, regardless of parents' education. Low marks coupled with having parents with Hauptschulabschluss further increases consistency with sufficiency.

We now turn to the analysis of all the conditions which might contribute to the prevention of gaining a higher qualification. In addition to giving the consistency with sufficiency for the various combinations of factors, the truth table also shows that there is limited diversity in the data: one combination, parents_high*MARKS*CITY*male does not have any cases at all, i.e. there aren't any women with good marks who grew up in a city and whose parents have Hauptschulabschluss in our sample. Other combinations have only very few cases. In order to ensure that the analysis is not based on such rows with very small n which may be unduly influenced by measurement error, only rows with n>3 are included in the Boolean analysis. Such a procedure is suggested by Ragin, who recommends establishing 'a frequency threshold for the relevance or viability of causal combinations' (Ragin 2005, p. 9). The rows analysed are shaded in grey in the truth table (table 10).

Table 10: Truth table Hauptschule with all conditions

| parents_high | marks | city | male | number | ~up | consist |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 4 | 1 | 1 |
| 0 | 0 | 0 | 1 | 12 | 1 | 1 |
| 1 | 1 | 1 | 1 | 3 | | 1 |
| 1 | 0 | 1 | 1 | 2 | | 1 |
| 0 | 0 | 1 | 0 | 1 | | 1 |
| 1 | 0 | 0 | 1 | 11 | 1 | 0.818182 |
| 0 | 1 | 0 | 1 | 10 | 0 | 0.7 |
| 0 | 1 | 0 | 0 | 13 | 0 | 0.692308 |
| 1 | 0 | 0 | 0 | 3 | | 0.666667 |
| 0 | 0 | 1 | 1 | 8 | 0 | 0.625 |
| 1 | 1 | 0 | 1 | 8 | 0 | 0.625 |
| 1 | 1 | 0 | 0 | 10 | 0 | 0.5 |
| 0 | 1 | 1 | 1 | 3 | | 0.333333 |
| 1 | 1 | 1 | 0 | 6 | 0 | 0.166667 |
| 1 | 0 | 1 | 0 | 1 | | 0 |
| 0 | 1 | 1 | 0 | 0 | | |

** TRUTH TABLE SOLUTION , rows with n<4 deleted **

| | raw coverage | unique coverage | consistency |
|---|---|---|---|
| | --- | --- | --- |
| MALE*marks*city+ | 0.318182 | 0.136364 | 0.913043 |
| parents_high*marks*city | 0.242424 | 0.060606 | 1.000000 |

solution coverage: 0.378788
solution consistency: 0.925926

Low marks do prevent pupils from moving up from Hauptschule, but they are not sufficient on their own. They have to be combined with an upbringing in a rural area and with either being male or having parents with Hauptschulabschluss in order to produce the outcome. In other words, low marks only have a negative effect when they are combined with ascriptive markers of social inequality.

### *5.2.2 Gymnasium*

The other group analysed is that of pupils who originally attended Gymnasium. The first truth table to be considered here is one which, again, only takes parental

education and marks into account (table 11). We start by looking at the proportions of individuals who have dropped out of Gymnasium, i.e. who have not achieved Abitur as their highest school qualification.

Table 11: Truth table Gymnasium: marks and parents

| parents_high | marks | number | down | consist |
|---|---|---|---|---|
| 0 | 0 | 51 | | 0.313725 |
| 1 | 0 | 103 | | 0.174757 |
| 1 | 1 | 118 | | 0.067797 |
| 0 | 1 | 70 | | 0.057143 |

The consistencies are fairly low in general, indicating that most pupils who attend Gymnasium will eventually obtain Abitur. We have already seen this in the cross-tabulation (table 8). Within the various groups, there are some important differences. The most striking finding here is that for individuals with good marks, the proportions of dropping out are nearly the same for those whose parents have Hauptschulabschluss compared with those whose parents have a higher qualification. For those with bad marks, however, the proportion of those dropping out is considerably higher when their parents have only Hauptschulabschluss. Another way of looking at it is to compare the proportions of those whose parents have one or the other qualification: the proportion of dropping out is about six times as high for those with bad marks whose parents have Hauptschulabschluss compared with good marks, whereas it is only about three times as high comparing the groups with good and bad marks whose parents have got a higher qualification. The bottom line is that for those pupils whose parents have Hauptschulabschluss, the effects of bad marks are considerably worse than for those whose parents have a higher qualification.

In the next step, a complete Boolean analysis is performed adding gender as a condition. I now consider – as for the Hauptschule analysis – the factors which lead to the expected outcome, in this case *not* dropping out from Gymnasium, i.e. obtaining Abitur.

Table 12: Truth table Gymnasium: marks, parents and gender

| parents_high | marks | male | number | ~down | consist |
|---|---|---|---|---|---|
| 0 | 1 | 1 | 27 | 1 | 1 |
| 1 | 1 | 1 | 48 | 1 | 1 |
| 0 | 1 | 0 | 43 | 1 | 0.906977 |
| 1 | 1 | 0 | 70 | 1 | 0.885714 |
| 1 | 0 | 1 | 65 | 1 | 0.876923 |
| 1 | 0 | 0 | 38 | 0 | 0.736842 |
| 0 | 0 | 1 | 30 | 0 | 0.733333 |
| 0 | 0 | 0 | 21 | 0 | 0.619048 |

** TRUTH TABLE SOLUTION **

| | raw coverage | unique coverage | consistency |
|---|---|---|---|
| | --- | --- | --- |
| MARKS+ | 0.594595 | 0.432432 | 0.936170 |
| PARENTS_HIGH*MALE | 0.354730 | 0.192568 | 0.929204 |

solution coverage: 0.787162
solution consistency: 0.920949

Having good marks does act as a protective factor. Both the truth table (table 12) and the resulting Boolean solution make it clear that good marks constitute a sufficient condition for obtaining Abitur once one has made it into Gymnasium, regardless of parental education or gender. But there is another route which also prevents drop-out: there is a group of males from a more highly educated background who are protected from demotion, regardless of their marks. Moreover, looking back at the truth table (table 12), we can see that the consistency of the fifth row is remarkably similar to

that of the row above. In other words, the proportion of dropping out for men with low marks whose parents have a qualification higher than Hauptschulabschluss is very similar to that of women who have the same parental background but who have good marks.

Finally, it is worth looking at the last row in the truth table (table 12). Its consistency is considerably lower than any of the others. This indicates that combining the three unfavourable conditions low marks, parents with Hauptschulabschluss and being female has a worse effect than having only one or two of them. In other words, only the combination of unfavourable conditions lowers the chances of obtaining Abitur, but not any single one.

## 6 Conclusion

This study provides an example of how institutional arrangements affect the specific way in which processes of social mobility and educational achievement take place. The main focus here was on intragenerational mobility, as opposed to intergenerational mobility (Allmendinger 1989; cf. section 2.1), although intergenerational mobility does enter the picture in that the parental education is taken into account.

At the age of 10, school children in Germany are selected into one of three school types each of which leads to a specific qualification. As we have seen, however, the qualifications eventually obtained are not entirely determined by initial school type. Instead, there is some discrepancy between school type and qualification achieved, albeit for a minority of individuals only. The institutional arrangements therefore resemble a sponsored mobility system, as described by Turner (1960; cf. section 2.1). However, empirically we find that mobility is present, and this is more in accordance

with a contest system. The existence of downward mobility seems especially to point to the German system being an interesting mixture of elements from both of the ideal types proposed by Turner: being chosen for an academic route at secondary school level at a relatively early age does not guarantee success, although it certainly makes it likely. On the other hand, not being chosen does not mean that there is then no further chance of obtaining a higher qualification, as can be seen from the fact that upward mobility also exists.

Analysing the factors which make mobility more or less likely showed, amongst other things, that social background as indicated by parental education is connected with intragenerational mobility. This is the case both when the allocation to a secondary school takes place (e.g., Baumert *et al.* 2003; Fend 2000, cf. section 2.3) and later, as demonstrated in this paper, thus confirming findings by Henz (1997) and Hillmert and Jacob (2005). This continued importance of social background could be taken to mean that the elite strives to maintain exclusivity for their children by upholding a sponsored system in which it is easier for their own offspring to be successful, whether at the initial selection at the age of 10 or by making more use of the flexibility the system offers later on. One conclusion or 'lesson', then, is that a selective school system does not eliminate bias, and that while it is possible to change track at a later stage, this flexibility will not be made use of by less privileged individuals. Privileged here refers to being male, having more highly educated parents and being brought up in a city rather than a rural area. Flexibility of course does not only include the potential for upward mobility, but also for demotion. We have seen that this negative side of flexibility does not affect the more privileged group. For instance, it has become clear that male pupils whose parents have a qualification higher than Hauptschulabschluss will be protected from dropping out of Gymnasium,

regardless of their academic performance as indicated by the marks obtained. This finding may be interpreted in the light of a rational choice model of educational decisions such as Breen and Goldthorpe's (1997), where subjective perception of probability of success as well costs are taken into account. For more highly educated parents, the costs of potential loss of status may outweigh the risk of their sons dropping out due to low marks, and therefore they decide to keep them at Gymnasium in the hope that they will succeed.

It has become clear that a complex mixture of academic performance and ascriptive factors determines the intragenerational mobility to be found after the transition to secondary school. Academic performance is crucially involved in the transitions analysed, but it is neither necessary nor sufficient on its own, as we have seen.

This brings me to some concluding remarks on the methodology. Analysing necessary and sufficient conditions for an outcome is at the heart of QCA. In addition, employing QCA in the analyses has made it clear that conjunctions of factors operate which should not be separated from one another. Therefore, trying to identify the net effects of the variables employed would not have been appropriate. Furthermore, QCA clearly brings out limited diversity (Ragin and Sonnett 2005) in the data, i.e. the lack of empirical cases for some combinations of conditions. This was the case for the full analysis of the Hauptschule data. We have seen there that some combinations of factors lack empirical cases altogether or have only very few instances. A regression analysis might have ignored this, rather, one might have attempted to make statements about these groups of people as well, even though they do not exist.

The QCA analysis has also shown that effects are not necessarily additive, as in the case of boys from a highly educated background who are protected from dropping out of Gymnasium, regardless of their marks. That is, we have found two alternative pathways which both lead to the desired outcome of not dropping out: having good marks *or* being male with highly educated parents. A regression analysis would also have identified these three factors, but it would not have been obvious that they constitute two alternative, compensatory pathways.

Finally, I have made use of the fact that with QCA it is possible to analyse the non-occurrence of an outcome rather than an outcome, which is not necessarily the same thing (Ragin 2005, cf. section 4).

**References**


Allmendinger, J. 1989. Educational systems and labor market outcomes. In *European Sociological Review*, 231-50.

Baumert, J., R. Watermann and G. Schümer. 2003. Disparitäten der Bildungsbeteiligung und des Kompetenzerwerbs. Ein institutionelles und individuelles Mediationsmodell. In *Zeitschrift für Erziehungswissenschaft*, 46-72.

Boudon, R. 1974. *The logic of sociological explanation*. Harmondsworth: Penguin.

Breen, R. and J.H. Goldthorpe. 1997. Explaining educational differentials. Towards a formal rational action theory. In *Rationality and Society*, 275-305.

Cooper, B. 2005. Applying ragin's crisp and fuzzy set qca to large datasets: Social class and educational achievement in the national child development study. In *Sociological Research Online*, http://www.socresonline.org.uk/10/2/cooper.html

———. 2006. Using Ragin's qualitative comparative analysis with longitudinal datasets to explore the degree of meritocracy characterising educational achievement in Britain. Paper presented at the Annual Meeting of the American Educational Research Association, *San Francisco*, 07/04/2006-11/04/2006.

Cooper, B. and J. Glaesser. 2007. Exploring social class compositional effects on educational achievement with fuzzy set methods: A British study. Paper presented at the Annual Meeting of the American Educational Research Association, *Chicago*, 09/04/2007 - 13/04/2007.

Drewek, P. and D.K. Müller. 1982. Zur sozialen Funktion der gymnasialen Oberstufe. In *Sekundarstufe II - Jugendbildung zwischen Schule und Beruf*, 108-29. Stuttgart: Klett-Cotta.

Fend, H. 1990. *Vom Kind zum Jugendlichen. Der Übergang und seine Risiken*. Bern: Huber.

———. 2000. *Entwicklungspsychologie des Jugendalters*. Opladen: Leske + Budrich.

———. 2006. Mobilität der Bildungslaufbahnen nach der 9. Schulstufe: Koppelung und Entkoppelung von Bildungsverläufen und Berufsausbildung an die Schulartzugehörigkeit - neue Chancen oder alte Determinanten? In *Soziale Ungleichheit im Bildungssystem. Eine empirisch-theoretische Bestandsaufnahme*, 265-89. Konstanz: uvk.

Glaesser, J. 2008. *Soziale und individuelle Einflüsse auf den Erwerb von Bildungsabschlüssen*. Konstanz: uvk.

Henz, U. 1997. Die Messung der intergenerationalen Vererbung von Bildungsungleichheit am Beispiel von Schulformwechseln und nachgeholten Bildungsabschlüssen. In *Generationen und sozialer Wandel*, 111-35. Opladen: Leske+Budrich.

Hillmert, S. and M. Jacob. 2005. Zweite Chance im Schulsystem? Zur sozialen Selektivität bei ‚späteren' Bildungsentscheidungen. In *Institutionalisierte Ungleichheiten*, 155-76. Weinheim, München: Juventa.

Kerckhoff, A.C. 1993. *Diverging pathways. Social structure and career deflections*. Cambridge: University Press.

Lieberson, S. 1985. *Making it count. The improvement of social research and theory*. Berkeley, Los Angeles, London: University of California Press.

Müller, W. 1998. Erwartete und unerwartete Folgen der Bildungsexpansion. In *Die Diagnosefähigkeit der Soziologie*, 81-112. Opladen: Westdeutscher Verlag.

Müller, W. and W. Karle. 1993. Social selection in educational systems in Europe. In *European Sociological Review*, 1-23.

Ochs, K. and D. Phillips. 2002. Comparative studies and 'cross-national attraction' in education: A typology for the analysis of English interest in educational policy and provision in Germany. In *Educational Studies*, 325-39.

Peisert, H. 1967. *Soziale Lage und Bildungschancen in Deutschland*. München: Piper.

Phillips, D. 2000. Learning from elsewhere in education: Some perennial problems revisited with reference to British interest in Germany. In *Comparative Education*, 297-307.

Ragin, C.C. 1987. *The comparative method. Moving beyond qualitative and quantitative strategies*. Berkeley, Los Angeles, London: University of California Press.

———. 2000. *Fuzzy-set social science*. Chicago and London: University of Chicago Press.

———. 2003. Recent advances in fuzzy-set methods and their application to policy questions. *Working paper*, http://www.compasss.org/Ragin2003.pdf

———. 2005. From fuzzy sets to crisp truth tables. *Working paper*, http://www.compasss.org/Raginfztt_April05.pdf

———. 2006. Set relations in social research: Evaluating their consistency and coverage. In *Political Analysis*, 291-310.

Ragin, C.C., K.A. Drass and S. Davey. 2006. *Fuzzy-set/qualitative comparative analysis 2.0*. Tucson, Arizona: Department of Sociology, University of

Arizona. Website: http://www.u.arizona.edu/%7Ecragin/fsQCA/software.shtml

Ragin, C.C. and J. Sonnett. 2005. Between complexity and parsimony: Limited diversity, counterfactual cases, and comparative analysis. In *Vergleichen in der Politikwissenschaft*, 180-97. Wiesbaden: VS Verlag für Sozialwissenschaften.

Schuchart, C. 2007. Schulabschluss und Ausbildungsberuf: Zur Bedeutung der schulartbezogenen Bildungsbiographie. In *Zeitschrift für Erziehungswissenschaft*.

Shavit, Y. and W. Müller eds. 1998. *From school to work. A comparative study of educational qualifications and occupational destinations.* Oxford: Clarendon Press.

Turner, R.H. 1960. Sponsored and contest mobility and the school system. In *American Sociological Review*, 855-67.